

**CLAIMS**

What is claimed is:

- 1           1.       A method for recalibrating a sense amplifier during a sense of a selected  
2 memory cell, comprising:  
3           measuring a physical property of the selected memory cell to produce a first  
4 measurement;  
5           comparing the first measurement to a first range, wherein the first range is indicative  
6 of a short circuit or an open in the selected memory cell;  
7           halting the sense of the selected memory cell if the first measurement exceeds the first  
8 range;  
9           comparing the first measurement to a second range, wherein the second range is a  
10 predetermined range signifying a recalibration of the sense amplifier may be necessary;  
11           proceeding with the sense if the first measurement is within the first range and the  
12 second range;  
13           repeating the steps of measuring and comparing for a predetermined number of  
14 iterations, if after each iteration, the measurement exceeds the second range but is within the  
15 first range; and  
16           recalibrating the sense amplifier, if after the predetermined number of iterations, the  
17 measurement still exceeds the second range but is within the first range.

- 1           2.       The method of claim 1, wherein the predetermined number of iterations is one.

1           3.       The method of claim 1, wherein the measured physical property is any one of  
2   the following: voltage, current, power dissipation, time to discharge, and time to charge.

1           4.       The method of claim 1, further comprising:  
2           incrementing a counter after each iteration, wherein the counter stores the number of  
3   completed iterations.

1           5.       The method of claim 1, further comprising:  
2           repeating the steps of measuring and comparing for a second predetermined number  
3   of iterations, if after each iteration the measurement exceeds the first range; and  
4           halting the sense, if after the second predetermined number of iterations the  
5   measurement still exceeds the first range.

1           6.       A method for testing for needed recalibration of a sense amplifier during a  
2 sense of a resistance value of a selected memory cell, the method comprising:

3           defining an average time value indicative of averaged time values for each of a  
4 selected set of memory cells, wherein the resistance of each cell of the selected set of cells is  
5 connected in series with a selected pre-charged capacitance, and with present operating  
6 parameters of the memory cell array applying;

7           determining a time value indicative of the discharge time of the selected capacitance  
8 upon connection to the resistance of the selected memory cell;

9           calculating a difference value by comparing the time value to the average time value;

10          halting the sense of the selected memory cell if the difference value exceeds a first  
11 range;

12          redetermining the time value and recalculating the difference value if the difference  
13 value is within the first range but exceeds a second range;

14          recalibrating the sense amplifier if the recalculated difference value still exceeds the  
15 second range; and

16          proceeding with the sense operation if the difference value or the recalculated  
17 difference value is within the second range.

1           7.       The method of claim 6, wherein the step of redetermining the time value and  
2 recalculating the difference value is performed one time before the step of calibrating is  
3 performed.

1           8.       The method of claim 6, wherein the step of redetermining the time value and  
2 recalculating the difference value is performed at least one time before the step of calibrating  
3 is performed.

1           9.       A method for increasing the quality of sensing during a read on a memory cell,  
2   the method comprising:

3           sensing a parameter of the memory cell;  
4           comparing the parameter to a threshold to determine whether the parameter is valid;  
5           enabling a sensing procedure upon determining the parameter is valid; and  
6           enabling a response procedure upon determining the parameter is not valid.

1           10.     The method of claim 9, wherein the response procedure comprises:  
2           halting the read; and  
3           facilitating recalibration of sensing equipment configured to perform the sensing.

1           11.     The method of claim 10, wherein the response procedure further comprises:  
2           reattempting the sense prior to recalibration of the sensing equipment to test for false  
3   negatives.

1           12.     The method of claim 10, wherein the response procedure further comprises:  
2           reattempting the read upon recalibration.

1           13.     The method of claim 9, wherein the sensing procedure is a triple-sensing  
2   destructive read procedure.

1           14.     The method of claim 9, wherein the memory cell is a memory cell of a  
2   magnetoresistive random access memory (MRAM) device.

1           15.     The method of claim 9, wherein the parameter is the resistance of the memory  
2     cell.

1           16.     The method of claim 9, wherein comparing the parameter to a threshold  
2     comprises:  
3           comparing the parameter to a variable threshold.

1           17.     A sensing system for sensing a state of a memory cell, the system comprising:  
2           means for sensing a parameter of the memory element;  
3           means for comparing the parameter to a first range to determine whether the  
4     parameter is valid;  
5           means for performing a sensing procedure upon determining the parameter is valid;  
6     and  
7           means for performing a response procedure upon determining the parameter is not  
8     valid.

1           18.     The system of claim 17, wherein the means for performing the response  
2     procedure comprises:  
3           means for comparing the parameter to a second range, whereby the second ranges  
4     indicates an erroneous memory cell;  
5           means for initiating the means for sensing to repeat sensing of the memory cell; and  
6           means for facilitating recalibration of the means for sensing if the repeat sensing of  
7     the memory cell determines the sensing to still be invalid.

1           19.     The system of claim 18, further comprising:

2           means for tracking a number of iterations of sensing and re-sensing performed by the

3     means for sensing; and

4           means for terminating re-sensing upon reaching a predetermined number of iterations

5     of re-sensing.

1           20.     A program for sensing a state of a memory element, the program being stored

2     on a computer-readable medium, the program comprising:

3           logic configured to enable sensing of a parameter of the memory element;

4           logic configured to compare the parameter to a first range and second range to

5     determine whether the parameter is valid;

6           logic configured to enable a sensing procedure upon determining the parameter is

7     valid;

8           logic configured to re-enable sensing of the parameter of the memory element upon

9     determining the parameter is invalid; and

10          logic configured to facilitate recalibration of sensing equipment configured to perform the

11         sensing, upon re-sensing the parameter for a predetermined number of iterations.